

THE VEGETATION OF PEARSON ISLANDS: A RE-EXAMINATION—FEBRUARY 1960

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[Read 12 June 1969]

SUMMARY

The botanical observations made on the 1960 Scientific Expedition to Pearson Islands off the west coast of Eyre Peninsula are compared with those of the 1923 Expedition. The number of angiosperm species recorded was increased by 9 to a total of 61 species; 1 fern and 7 fungal species are also recorded, and collections of marine algae were made but have not been fully determined.

A vegetation map is presented together with detailed studies on structure and composition of seven representative plant communities.

The probable effect of seals in the changes observed in the vegetation of the travertine plateau of Middle Island between 1923 and 1960 is discussed.

INTRODUCTION

In January 1923, the late Professor F. Wood Jones led a research expedition to examine the natural history of the Pearson Islands, 40 miles off the west coast of Eyre Peninsula, South Australia, in the chain of islands named the Investigator Group by Matthew Flinders in 1802. Amongst the party were T. G. B. Osborn, Professor of Botany of the University of Adelaide and Mr. T. D. Campbell. Osborn made very detailed observations on the vegetation of the Pearson Islands, and these were published in the Transactions of this Society in 1923. A short Appendix on the soils of the Islands was included by J. G. Wood.

In 1960 (Feb. 10-23), Professor T. D. Campbell led a second research expedition to the Islands. Among other natural history studies, the vegetation of these small Islands was again carefully examined and compared with the botanical collections, notes and photographs made by Osborn in 1923.

The 1960 botanical programme was as follows:—

- (1) Preparation of an herbarium of all fern and angiosperm species to be found on the Islands so that changes in species composition, if any, could be compared with the collection made by Osborn in 1923.
- (2) Collection of fungal, moss, lichen, and marine algal species, details of which were not included in Osborn's paper. The algal collection, made largely along the rocky shorelines, was supplemented by material dredged from around the Islands.
- (3) Preparation of a detailed vegetation map of the Islands by interpreting, by land reconnaissance, recent aerial photographs of the area.
- (4) Examination of the structure of characteristic plant communities and associated soils.
- (5) Observation of any vegetation changes which may be obvious when sites identical to those photographed by Osborn in 1923 were again examined.

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RESULTS

The floristics and ecological relationships of the plant communities found on Pearson Islands have been adequately described by Osborn (1923). This paper aims at supplementing Osborn's paper with minimum repetition.

The major plant communities of the Islands together with notes on their habitat are summarised in Table 1. A vegetation map of the Islands (Fig. 1) derived from aerial photographs and land reconnaissance, outlines the distribution of these plant communities. Detailed notes on the structure, floristics and habitat of seven representative plant communities are given in Tables 2-8.

TABLE 1
Major plant communities recorded on Pearson Islands

Formation	Association	Habitat	Detailed records (Tables 2-8)
Low open-forest Low woodland }	<i>Casuarina stricta</i>	Granitic hills of North Island A few trees on South Island	Site 1
Closed-scrub	<i>Melaleuca halmaturorum</i>	Brackish watercourse on North Island	—
Open-scrub	<i>Melaleuca lanceolata</i>	Lower granitic hill slopes on North Island	Site 2
Open-heath (=shrub community)	(1) <i>Olearia ramulosa</i> — <i>Leucopogon parviflorus</i> (2) <i>Nitruia schoberi</i>	(1) Exposed granitic slopes and crevices on all Islands (2) Edge of travertine plateau on South and Middle Island	— —
Low open-scrub (=mat plant community)	(1) <i>Atriplex cinerea</i> (dwarf) (2) <i>Disphyma australe</i> — <i>Enchylaena tomentosa</i> (3) <i>Arthrocnemum halocnemoides</i>	(1) Travertine plateau of South Island (flattened by seals) (2) A few small areas on Middle and North Islands	(1) Site 5 (2) Site 6 (3) Site 7
Low shrubland (dense phase)	(1) <i>Melaleuca lanceolata</i> (prostrate)— <i>Atriplex paludosa</i> (2) <i>Atriplex paludosa</i> — <i>Rhagodia crassifolia</i> (a) <i>Atriplex paludosa</i> (b) <i>Rhagodia crassifolia</i> — <i>Zygophyllum</i> (3) <i>Atriplex cinerea</i>	(1) On travertine on wind-swept south-east side of North Island (2) Lower granitic slopes, often bordering travertine of North Island and to lesser extent South Island (3) Travertine plateau of Middle Island	(1) Site 3 (2) — Site 4 (3) —

Lists of vascular plants (ferns and angiosperms) and fungi, collected on the Expedition are given in Appendix I and II respectively. There are small differences between the list of angiosperm species collected by Osborn in January 1923 and the collection made in February 1960.

The following species were not relocated: *Trichlochin muelleri*,* *Vulpia bromoides*, *Agropyron scabrum*, *Bulbinopsis semibarbata*, *Centrolepis murrayi*, *Chenopodium desertorum*,* *Westringia rigida*, *Nicotiana suaveolens*(?), *Cotula coronopifolia*, and *Sonchus asper*.

* Listed from Pearson Islands by Black (1943-57).

PEARSON ISLANDS

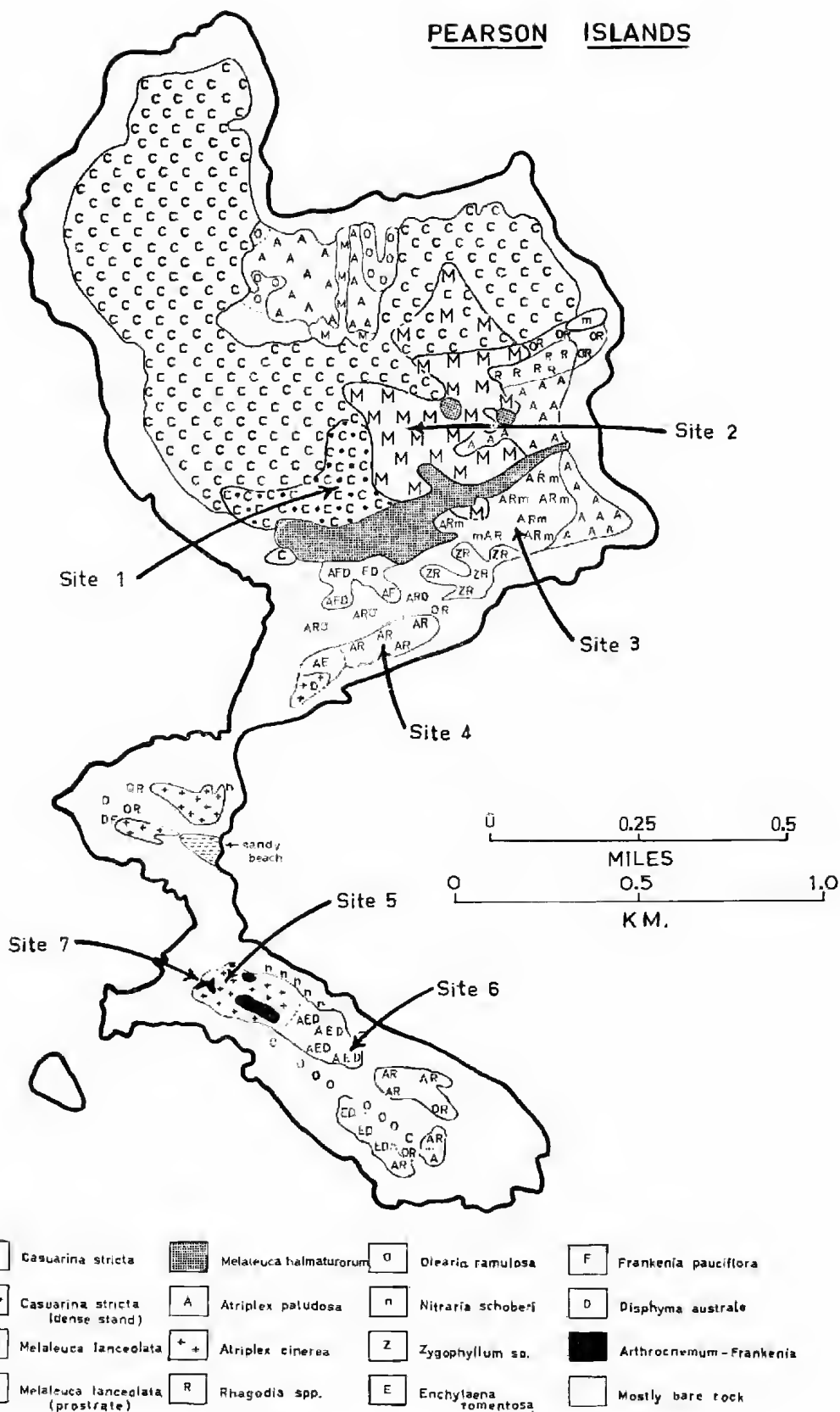


Fig. 1. Vegetation map of Pearson Islands.

TABLE 2

*North Island, Site 1**Location:* Edge of drainage channel on southern side of 781 Hill. (Fig. 1)*Geology:* Granitic rock

Soil: 0-0.5 in. *Casuarina* needle litter
 0.5-9 in. Dark grey coarse sandy loam with organic matter (pH 6.8)
 9-12 in. Brown coarse sandy loam over decomposing granite

Animals: Wallabies common*Vegetation:* (1) Formation: - Low open-forest (dense phase)(2) Association: - *Casuarina stricta*

(3) Structure: -

Species	Height (ft.)	Canopy Projective cover %
<i>Casuarina stricta</i> *	18—25	77
<i>Correa reflexa</i>	3—4	} 2
<i>Rhagodia crassifolia</i>	2	
Bare ground	—	21

*Trees per acre: 412 Trunks per tree: 1.8 (range 1-3)
 Mean diam. trunk: 6.1 in. (range 2-15 in.)

Sampling technique: Eight random quadrats each 5 yards square

TABLE 3

*North Island, Site 2**Location:* South side of East Hill (Fig. 1)*Geology:* Granitic rock

Soil: 0.0-5 in. Small amount of litter, moss and gravel
 0.5-1.5 in. Dark brown sandy loam with organic matter (pH 6.4)
 1.5-12 in. Brown coarse sandy loam (pH 6.6) over decomposing granite

Animals: Wallabies common*Vegetation:* (1) Formation: - Open-scrub(2) Association: - *Melaleuca lanceolata*

(3) Structure: -

Species	Height (ft.)	Canopy Projective cover %
<i>Melaleuca lanceolata</i> *	8-12	46
<i>Rhagodia crassifolia</i> †	0.5-1.5	33
Bare ground (often exposed granite)	—	37

*Trunks per tree 3.6 (range 2-5) †Some *Rhagodia* bushes occur under *Melaleuca*

Sampling technique: Eight random line transects each 20 yards long

TABLE 4

*North Island, Site 3**Location:* Windswept south-east side of North Island (Fig. 1)*Geology:* Travertine limestone plateau

Soil: 0.3 in. Dark brown loam with organic matter (pH 7.0)
 3 in. Travertine limestone

Animals: Wallabies common*Vegetation:* (1) Formation: - Low shrubland (dense phase)(2) Association: - *Melaleuca lanceolata* - *Atriplex paludosa*

(3) Structure: -

Species	Height (inches)	Canopy† Projective cover (%)
<i>Melaleuca lanceolata</i> *	10—15	33
<i>Atriplex paludosa</i>	12—18	42
<i>Rhagodia crassifolia</i>	12—18	4
<i>Enchylaena tomentosa</i>	12—18	2
<i>Threlkeldia diffusa</i>	6—9	trace
Bare ground	—	21

*Prostrate under influence of southerly winds; one specimen had a prostrate trunk 8 yards long.

†A few plants intertwine or overlap.

Sampling technique: Eight random line transects each 10 yards long.

TABLE 5

North Island, Site 4

Location: South side of North Island (Fig. 1)

Geology: Near granitic boulders close to travertine limestone plateau

Soil: Surface Small leaf litter layer

0.14 in. Brown coarse sandy loam (pH 6.8) over decomposing granite

Animals: Penguin burrows common. Wallabies common.

Vegetation: (1) Formation: — Low shrubland (dense phase)

(2) Association: — *Atriplex paludosa*

(3) Structure: —

Species	Height (inches)	Canopy Projective cover (%)
<i>Atriplex paludosa</i>	15—24	55
<i>Rhagodia crassifolia</i>	6	0.5
<i>Olearia ramulosa</i>	12	0.5
Bare ground	—	44

Sampling technique: Eight random line transects each 10 yards long.

TABLE 6

South Island, Site 5

Location: North-east corner of travertine limestone plateau. (Fig. 1)

Geology: Travertine limestone plateau

Soil: 0.1 in. Grey brown sandy clay loam with organic matter

1.9 in. Brown sandy clay loam (pH 7.6) over travertine limestone

Animals: Seals were observed sun-baking on this area. Cape Barron geese were recorded.

Vegetation: (1) Formation: — Low open-scrub (= mat plant community)

(2) Association: — *Atriplex cinerea*

(3) Structure: —

Species	Height (inches)	Canopy Projective cover (%)
<i>Atriplex cinerea</i>	3—4	51
<i>Frankenia pauciflora</i>	3—4	1
Bare ground	—	48

Sampling technique: Eight random quadrats each 1 yard square.

TABLE 7

South Island, Site 6

- Location:* South-east corner of travertine limestone plateau. (Fig. 1)
Geology: Travertine limestone plateau
Soil: 0.1 in. Dark brown coarse sandy loam with organic matter (pH 8.9)
 1.8 in. Brown coarse sandy loam (pH 6.9) over travertine limestone
Animals: Seals probably sun-bake on the area. Cape Barren geese were observed
Vegetation: (1) Formation: - Low open-scrub (= mat plant community)
 (2) Association: - *Disphyma australe* - *Enchylaena tomentosa*
 (3) Structure: -

Species	Height (inches)	Canopy Projective cover (%)
<i>Disphyma australe</i>	3-4	38
<i>Enchylaena tomentosa</i>	3-4	15
<i>Threlkeldia diffusa</i>	3-4	8
<i>Atriplex patulosa</i>	up to 12	2
Bare ground	—	37

Sampling technique: Eight random quadrats each 1 yard square.

TABLE 8

South Island, Site 7

- Location:* North-west corner of travertine limestone plateau. (Fig. 1)
Geology: Travertine limestone plateau
Soil: 0.1 in. Dark brown coarse sandy loam
 1.6 in. Brown coarse sandy loam over travertine limestone
Animals: Seals probably sun-bake on this area. Cape Barren geese were observed
Vegetation: (1) Formation: - Low open-scrub (= mat plant community)
 (2) Association: - *Arthrocnemum halocnemoides*
 (3) Structure: -

Species	Height (inches)	Canopy Projective cover (%)
<i>Arthrocnemum halocnemoides</i>	2-4	50
<i>Frankenia pauciflora</i>	2-4	7
Bare ground	—	43

Sampling technique: Eight random quadrats each 1 yard square

The following extra species were recorded in 1960: *Scirpus congruus*(?), *Centrolepis strigosa*, *Calandrinia calyptrata*, *Stellaria media*(?), *Crassula sieberiana*, *Oxalis corniculata*, *Zygophyllum billardieri*, *Plantago varia*, and *Galium gaudichaudii*.

So far 1 species of fern, 11 species of monocotyledons and 50 species of dicotyledons have been recorded from the Islands. The supplementary list, collected February 1960, includes a number of seasonal species more of which may appear during the winter-spring seasons.

It is interesting that the tiny *Centrolepis murrayi* collected from the Islands in 1923 and recorded as a new species by Black (1923) was not relocated and yet many plants of *Centrolepis strigosa*, not collected in 1923, were found. Willis (1953) recorded both species from the Recherche Archipelago on the western side of the Great Australian Bight.

CHANGES IN THE VEGETATION

As far as possible photographs and notes made by Osborn in 1923 were matched in 1960. Within the limits of this technique, little change was obvious over much of the Islands except on the travertine plateau of the Middle Island.

Osborn recorded, both by photograph (plate IX, fig. 1) and in the text (p. 108), that an annual community of *Lepidium foliosum*, *Apium prostratum*, and *Senecio lautus* covered much of the plateau. At the junction of the travertine plateau and the talus fan derived from the granitic hill dominating Middle Island, a belt of *Atriplex cinerea*, typically a constituent of the travertine vegetation, was noted.

In 1960 *Atriplex cinerea* had extended its range to cover much of the travertine plateau (Fig. 1); no trace of the annual community could be found.

Osborn does not refer to seals on the Islands. During February, 1960, seals were common on the eastern side of Middle Island and on the north-eastern side of South Island. These heavy animals sun-baked mostly on the granitic rocks and sand near the shore line but occasionally climbed higher onto the travertine plateau. During February, 1960, they were observed sun-baking on the stunted stand (3-4 inches tall) of *Atriplex cinerea* growing on South Island (Fig. 1, Site 5). It is probable that seals may have devastated much of the *Atriplex cinerea* stand on the travertine plateau of Middle Island prior to 1923. Since that date either the seal population has fallen or the travertine plateau has become temporarily undesirable as a basking area, thus enabling *Atriplex cinerea* to recolonise the area.

Wallabies (*Petrogale pearsoni*) ranged over the whole of the North Island (presumably eating *Atriplex paludosa*), but were apparently restricted to that Island by the small strait about 100 yards wide which can be waded only at low tide.

Gillham (1960) indicated that extensive changes have occurred around penguin rookeries in Victorian sea-bird colonies. "The presence of the sea-birds leads to a broadening of the coastal belt of salt-resistant plants and elimination of the indigenous, more inland type of flora." The penguin burrows on Pearson Islands are confined to the coastal belt—in the *Atriplex paludosa*—*Rhagodia crassifolia*, *Atriplex cinerea*, and *Olearia ramulosa*—*Leucopogon parviflorus* associations of granitic slopes and detritus fans. Gillham's observations would suggest that, around penguin burrows, these communities may be gradually replaced by even more salt-resistant plants such as the "mat plant" communities—*Disphyma australe*—*Enchylaena tomentosa* and *Arthrocnemum halocnemoides* associations. Such a change may be slowly occurring around the small penguin rookeries on Pearson Islands but was by no means obvious.

Penguins, however, rarely burrow into the travertine plateau but prefer to nest in burrows under granitic rocks. It is thus improbable that they were the cause of the vegetation change observed on the travertine plateau of Middle Island.

ACKNOWLEDGEMENTS

Grateful thanks are due to Professor T. D. Campbell, leader of the Expedition, to Ampol Petroleum Pty. Ltd. who assisted with finance and to Mr. Max Fanser of Ungarra, Eyre Peninsula, who provided transport to the Islands. Mr. I. M. Thomas, Dr. S. J. Edmonds, Dr. B. B. Carrodus and Dr. P. Miles, scientific personnel on the Expedition, helped in many ways and provided stimulating conversations. Mr. K. Phillips acted as photographer.

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APPENDIX I

List of fern and angiosperm species collected on Pearson Islands by T. G. B. Osborn (January 1923) and R. L. Specht (February 1960). The collections have been deposited in the State Herbarium of South Australia, Botanic Gardens, Adelaide.

	Recording dates	
	Jan. 1923	Feb. 1960
Polypodiaceae		
<i>Cheilanthes tenuifolia</i> (Burm. f.) Swartz	*	*
Scheuchzeriaceae		
<i>Triglochin muelleri</i> Buch.	*	—
Gramineae		
<i>Agrostis avenacea</i> J. F. Gmel.	*	*
<i>Notodanthonia racemosa</i> (R.Br.) Zotov†	*	*
<i>Poa poaeformis</i> (Labill.) Druce	*	*
<i>Vulpia bromoides</i> (L.) S. F. Gray	*	—
<i>Agropyron scabrum</i> (Labill.) Beauv.	□	—
Cyperaceae		
<i>Scirpus congruus</i> (Nees) S. T. Blake (?)	—	*
Liliaceae		
<i>Dianella revoluta</i> R.Br.	*	*
<i>Bulbinopsis semibarbata</i> (R.Br.) Borzi	*	—
Centrolepidaceae		
<i>Centrolepis murrayi</i> J. M. Black	*	—
<i>C. strigosa</i> (R.Br.) R. & S.	—	*
Casuarinaceae		
<i>Casuarina stricta</i> Ait.	*	*
Chenopodiaceae		
<i>Rhagodia baccata</i> (Labill.) Moq.	*	*
<i>R. crassifolia</i> R.Br.	*	*
<i>Chenopodium desertorum</i> (J. M. Black) J. M. Black	*	—
<i>Atriplex cinerea</i> Poir.	*	*
<i>A. paludosa</i> R.Br.	*	*
<i>Enchylaena tomentosa</i> R.Br.	*	*
<i>Threlkeldia diffusa</i> R.Br.	*	*
<i>Arthrocnemum halocnemoides</i> Nees	*	*
var. <i>pergranulatum</i> J. M. Black	*	*
<i>Salicornia quinqueflora</i> Bunge ex Ung.-Sternb.	*	*
<i>Suaeda australis</i> (R.Br.) Moq.	*	*
Aizoaceae		
<i>Tetragonia umplexicoma</i> (Miq.) Hook. f.	*	*
<i>Carpobrotus aequilaterus</i> (Haw.) N.E.Br.	*	*
<i>Disphyma australe</i> (Ait.) N.E.Br.	*	*

† Probably identified by Osborn as *Danthonia penicillata* (Labill.) F. Muell.

Portulacaceae		
<i>Calandrinia calypttrata</i> Hook. f.	—	•
Caryophyllaceae		
<i>Scleranthus pungens</i> R.Br.	•	•
<i>Stellaria media</i> (L.) Vill. (?)	—	•
Cruciferae		
<i>Lepidium foliosum</i> Desv.	•	•
Crassulaceae		
<i>Crassula sieberiana</i> (Schultes) Druce	—	•
Geraniaceae		
<i>Pelargonium australe</i> Willd.	•	•
Oxalidaceae		
<i>Oxalis corniculata</i> L.	—	•
Zygophyllaceae		
<i>Nitraria schoberi</i> L.	•	•
<i>Zygophyllum billardieri</i> DC. (?)	—	•
Rutaceae		
<i>Correa reflexa</i> (Labill.) Vent.		
var. <i>nummulariifolia</i> (Hook.f.) Wilson	•	•
Sapindaceae		
<i>Dodonaea viscosa</i> Jacq.	•	•
Rhamnaceae		
<i>Spyridium phyllicoides</i> Reiss.	•	•
Malvaceae		
<i>Lavatera plebeia</i> Sims		
var. <i>tomentosa</i> Hook.f.	•	•
Frankeniaceae		
<i>Frankenia pauciflora</i> DC.	•	•
Thymelaeaceae		
<i>Pimelea serpyllifolia</i> R.Br.	•	•
Myrtaceae		
<i>Melaleuca lanceolata</i> Otto	•	•
<i>M. halmaturorum</i> F. Muell. ex Miq.	•	•
<i>Calytrix tetragona</i> Labill.	•	•
Umbelliferae		
<i>Apium prostratum</i> Labill. ex Vent.	•	•
<i>Trachymene pilosa</i> Sm.	•	•
Epacridaceae		
<i>Leucopogon parviflorus</i> (Andr.) Lindl.	•	•
Labiatae		
<i>Westringia rigida</i> R.Br.		
var. <i>dolichophylla</i> Ostenf.	•	—
Solanaceae		
<i>Lycium australe</i> F. Muell.	•	•
<i>Nicotiana suaveolens</i> Lehm. (?)	•	—
Myoporaceae		
<i>Myoporum insulare</i> R.Br.	•	•
<i>M. deserti</i> A. Cunn. ex Benth.	•	•
Plantaginaceae		
<i>Plantago varia</i> R.Br.	—	•
Rubiaceae		
<i>Galium gaudichaudii</i> DC.	—	•

Compositae

<i>Olearia ramulosa</i> Labill.	*	*
<i>Cotula coronopifolia</i> L.	*	—
<i>Ixiolaena supina</i> F. Muell.	*	*
<i>Cassinia spectabilis</i> R.Br.	*	*
<i>Calocephalus brownii</i> F. Muell.	*	*
<i>Senecio lautus</i> Forst. f. ex Willd.	*	*
<i>S. cunninghamii</i> DC.	*	*
<i>Sonchus asper</i> (L.) Hill		
var. <i>littoralis</i> J. M. Black	*	—

APPENDIX II

List of fungal species collected on Pearson Islands by R. L. Specht (Feb. 1960) identified by Miss Judy Brown. The collection has been deposited in the mycological collection of the Waite Agricultural Research Institute.

Coriolum cinnabarinum (Jacq.) G. H. Cunn.

Corticium sp.

Fomes rimosus Berk.

Geastrum floriforme Vitt.

Hexagona decipiens Berk.

Naucoria semiorbicularis (Bull.) Fr.

Polystictus versatilis Berk.